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(19)

(54) CHILD-RESISTANT PRESS-AND-TURN CLOSURE

(71) We, ZELLER PLASTIK, Koehn, Gräbner & Co., a German Kommanditgesellschaft organised and existing under the laws of the Germany, of D-5583 Zell/Mosel, Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:–

This invention relates to child-resistant closures of the type called press-and-turn closures suitable for closing necks of containers and especially bottles. The closures are made from plastics material.

A closure of this kind, sold in West-Germany, has a screw-cap which holds an overcap with an axial free motion. Both caps have projections which can interlock and unlock within the axial free motion. Alternatively there can be provided projections at one of the caps and recesses at the other cap.

In such closures spring elements are provided between overcap and screw-cap. The spring elements are formed at the inner face of the screw-cap. They are holding both caps in a certain distance within the axial free motion. Hereby is achieved that the projections or projections and recesses of both caps do not interengage by themselves during an unscrewing motion. An axial force is to be exerted, i.e. the overcap is to be pressed against the container in order to overcome the spring force and to make the projections or projections and recesses interengage.

Known types of such closures have matching sets of projections at their caps, one of the sets being used for screwing-on, the other set being used for unscrewing. In a further known type of such closures the spring elements themselves are used as driving elements in screwing-on. The known closures mentioned above have the following disadvantages:

1) The choice of plastics materials is limited because of the necessary elasticity of the spring elements. However, to introduce an independent spring element would make production and assembly of the closure unduly expensive.

2) Forming cap and spring elements in one piece would require complicated and expensive injection tools and consequently increased production cost.

3) The spring elements weaken under continuous strain. This may already occur when the closures are stapled for shipment from producer to packer, i.e., the person who fills the containers and applies the closures thereto; more so, however, when the filled and closed containers are stapled. Weakened springs, however, do not provide the desired child resistance.

It is an object of the invention to provide a child resistant press-and-turn closure without spring elements and therefore without the disadvantages outlined above.

The present invention provides a child resistant press-and-turn closure for a container having an externally screw-threaded neck, the closure being made from plastics material and comprising a screw cap and an overcap, the screw cap being contained within the overcap and the screw cap and overcap being relatively movable both axially and angularly, projections on one of said caps and co-operating projections or recesses on or in the other of said caps, said projections or recesses having first faces on one side thereof which co-operate to transmit rotational movement from the overcap to the screw cap when the overcap is rotated in a direction to screw the closure onto the neck of a said container and second faces on the opposite sides thereof, the second face of each projection or recess of one of said caps being a cam face whereby, in use, the overcap will rotate relative to the screw cap with said projections or recesses of the different cap camming past one another when the overcap is rotated in a direction to unscrew the closure from the neck of a said container unless the overcap is moved axially relative to the screw

cap so that each said cam faces is engaged by an edge of the second face of a projection or recess f the ther cap with a force sufficient t overcome the cam action.

By the invention not only the spring elements are eliminated but, in comparison with the known closures mentioned above, also one set of projections at the overcap and one set of projections at the screw-cap. According to the invention the same set of projections is used for screwing on as well as for unscrewing. When screwing on, a filled container, especially a bottle, is normally standing upright. The projections or projections and recesses of both caps are then interengaging, and the screw-cap is automatically diven when the overcap is turned. For screwing-off, however, it is necessary to exert an axial force, thus pressing the overcap against the container. The cam action tends to separate the projections of both caps or the projections of one cap from the recesses of the other cap in axial direction, so that the overcap only cams past the screw-cap but does not drive the screw-cap in unscrewing direction. Only if the overcap is pressed with sufficient force onto the screw-cap, is there generated sufficient friction to overcome the cam action so that the screw-cap is driven in unscrewing direction.

An embodiment of the invention will now be illustratively described with reference to the accompanying drawings in which:—

Figure 1 shows an overcap of a closure according to the invention, at its left hand side in an axial section and at its right hand side in a sideview,

Figure 2 shows a screw-cap in a similar representation,

Figure 3 is a partial view of the overcap according to figure 1 seen from below, i.e. from its inner side, and

Figure 4 is a partial view of the screw-cap according to figure 2, seen from its upper and outer side.

Overcap 1 and screw-cap 3 are produced separately and are made from plastics material. Their dimensions are such that the screw-cap can be inserted into the overcap. The lower rim 5 of the screw-cap 3 snaps over and thereafter rests on a snapring 7 of the overcap 1. The two caps are thus captive each with the other. The screw-cap can move axially within the overcap and can be turned freely in relation to the overcap as long as projections—which are still to be described—do not interlock.

The screw-cap 3 has at its outer face 9 six projections 11 which are arranged radially (figure 4) and show a nearly square cross section. Their edges 13 are slightly rounded-off (figure 2).

The overcap 1 has six projections 17 at its inner face 15. Each of these projections has a first face 19 on one side thereof which lies in an axial radial plane and an inclined cam face 21 on the opposite side thereof. The cam face 21 of each projecti n 17 lies in a radial plane which is inclined with respect to said axial radial plane by an angle β which is 45 degrees in the embodiment shown, but which may, however, be from substantially 30 degrees to substantially 60 degrees. According to the material employed the angle β has to be sufficiently large to safely produce an axial force tending to lift the overcap during an unscrewing movement. The larger the angle is made the greater becomes in general the lifting force until—if desired—considerable axial force has to be applied by the user between the screw cap and overcap in order to unscrew the screw cap. The projections 11 of the screw-cap 3 described above have first and second faces 29 and 31, respectively which, like the faces 19, lie in axial radial planes. The faces 29 cooperate with the faces 19 of projections 17 when the overcap is rotated in one direction whilst the edges 13 of the faces 31 cooperate with the cam faces 21 when the overcap is rotated in the opposite direction.

The screw-cap is inserted into the overcap during the production process. Both thus reach the packer, i.e., the person who fills a container and applies the closure thereto, captive each with the other. If a press-and-turn closure consisting of both caps 1 and 3 is put onto the neck of an upright standing container; e.g., bottle, the overcap falls down onto the screw-cap so that the projections 17 of the overcap project into the interspaces between the projections 11 of the screw-cap. If now the overcap is turned for closing, in this case in a clockwise direction, the axial faces 19 of the projections 17 of the overcap bear against the axial faces 29 of the projections 11 of the screw-cap, exert a clockwise torque onto the screw-cap and thus turn it until the closure is tightly closed on the container.

If a child tries to open the closure, the cam faces 21 cam over the rounded-off edges 13 of the projections 11, thus lifting the overcap axially from the screw-cap and preventing unscrewing thereof.

If the closure is to be opened by an adult person, he or she has to exert an axial force on the overcap which is sufficient to overcome the cam action between the cam faces 21 and the edges 13 so that the unscrewing torque exerted by the user will effectively drive the screw-cap in an unscrewing direction to enable the closure to be removed from the container.

The user as well as the packer can close the closure in the normal way. If, as usual, the container, e.g., bottle is held upright, the faces 19 and 29 interengage automatically. If not, the interengagement can be achieved by a slight pressure exerted on the overcap.

The interlocking projections or projections and recesses may be arranged at the sidewalls of the screw-cap and overcap instead of as shown at their faces 9 and 15.

WHAT WE CLAIM IS:—

1. A child resistant press-and-turn closure for a container having an externally screw-threaded neck, the closure being made from plastics material and comprising a screw cap and an overcap, the screw cap being contained within the overcap and the screw cap and overcap being relatively movable both axially and angularly, projections on one of said caps and co-operating projections or recesses on or in the other of said caps, said projections or recesses having first faces on one side thereof which co-operate to transmit rotational movement from the overcap to the screw cap when the overcap is rotated in a direction to screw the closure onto the neck of a said container and second faces on the opposite sides thereof, the second face of each projection or recess of one of said caps being a cam face whereby, in use, the overcap will rotate relative to the screw cap with said projections or recesses of the different caps camming past one another when the overcap is rotated in a direction to unscrew the closure from the neck of a said container unless the overcap is moved axially relative to the screw cap so that each said cam face is engaged by an edge of the second face of a projection or recess of the other cap with a force sufficient to overcome the cam action.

2. A closure according to claim 1, wherein said first faces are arranged in axial radial planes.

3. A closure according to claim 2, wherein said cam faces are arranged in radial planes which are inclined with respect to said axial radial planes by an angle of from 30 to 60 degress, particularly 45 degrees.

4. A closure according to any one of the preceding claims, wherein said caps each comprise, in the normal p sition f use, a top wall and a depending peripheral wall and said projections or recesses are provided on or in the top walls thereof.

5. A closure according to any ne of claims 1 to 3, wherein said caps each comprise a peripheral wall and said projections or recesses are provided on or in the peripheral walls thereof.

6. A closure according to any one of the preceding claims, wherein each of said caps has an equal number of said projections or recesses and wherein said projections or recesses are evenly spaced circumferentially of said caps.

7. A closure according to any one of the preceding claims, wherein each cap has projections thereon, the projections on one of said caps each comprising a said first face and a said cam face and the projections on the other of said caps each comprising first and second faces which are substantially parallel to one another.

8. A closure according to claim 7, wherein each said edge is located at the junction of the second face and a surface extending between the first and second faces of a projection of said other cap.

9. A closure according to any one of the preceding claims, wherein said edges are rounded edges.

10. A closure for a container having an externally screw-threaded neck, the closure being substantially as herein described with reference to the accompanying drawings.

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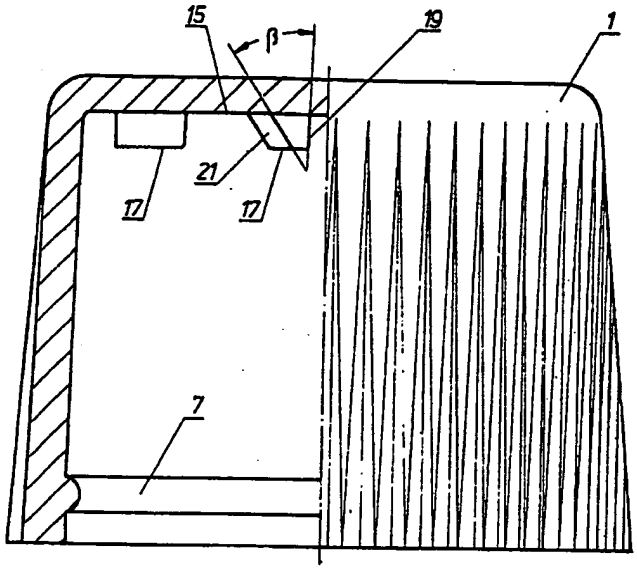

Fig.1

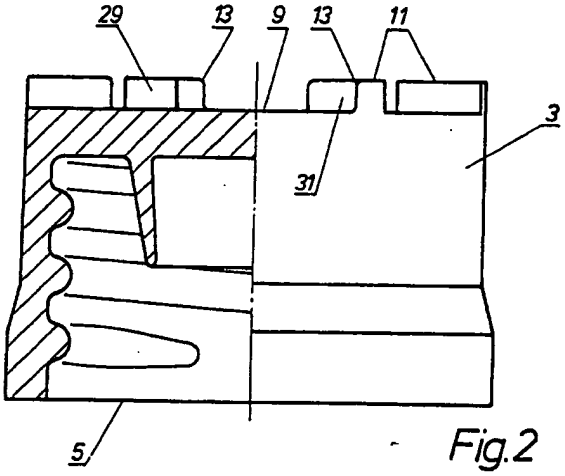

Fig.2

1529999 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

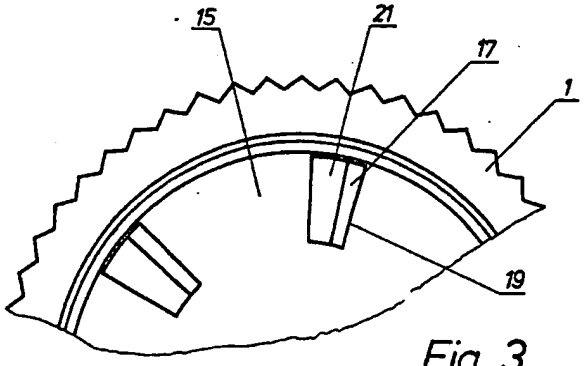

Fig. 3

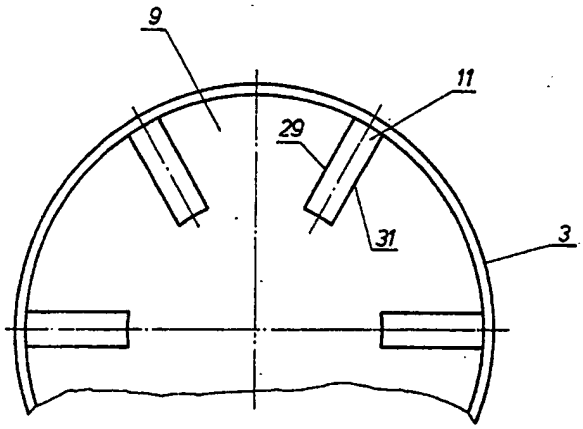

Fig. 4